Moving Massachusetts Forward
massDOT
CONCEPTUAL ENGINEERING & DRAFT ENVIRONMENTAL IMPACT REPORT
Red Line
Blue Line
CONNECTOR
Working Group Meeting No. 6
Alternatives Analysis and DEIR Update Meeting
February 23, 2010

Agenda

1. Introductions and Guidelines Review - RVA & MassDOT
2. Alternatives Conceptual Engineering Update - STV
3. Environmental Impacts - VHB
4. WG Comment on Alternatives Analysis, Technical Reports and DEIR Executive Summary - WG & Team
5. DEIR Schedule - STV
6. Public Comment

Introductions and Guidelines Review

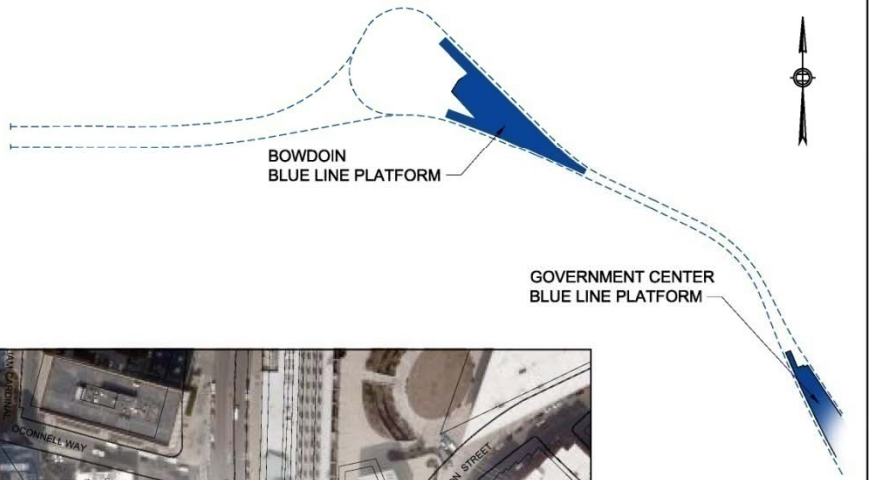
Purpose of Meeting

To present the overall project and alternatives that will be evaluated as part of the DEIR. The goal is to solicit feedback in regards to each of the alternatives and their associated systems.

Please do not hesitate to ask questions during the presentation.

Project Overview

- **1500’ extension of Blue Line to Charles/MGH**
- **Possible *Elimination* or *Relocation* of Bowdoin Station**
- **Legal Commitment to Complete Design by 12/2011**



LEGEND:

- PROPOSED RED-BLUE CONNECTOR PROJECT
- CENTERLINE OF EXISTING RED LINE TRACK
- EXISTING RED LINE TUNNEL WALL
- CENTERLINE OF EXISTING BLUE LINE TRACK
- EXISTING BLUE LINE TUNNEL WALL

0 200' 400'

SCALE: 1" = 200'-0"

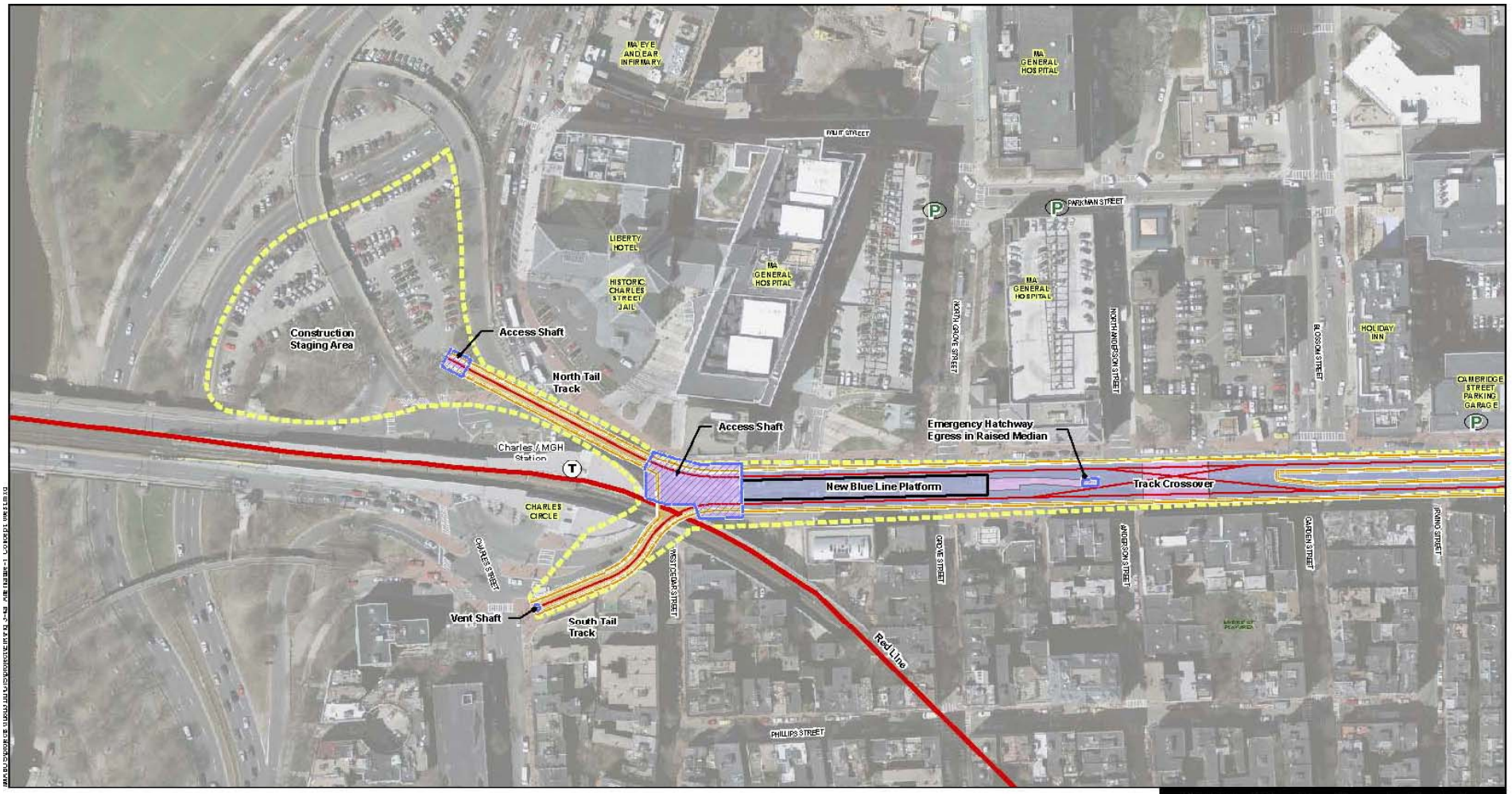
Selection of Preferred Alternative

- No Build

- ✓ Alternative 1 – Red/Blue Line Connector with Elimination of Bowdoin Station

- Alternative 2 – Red/Blue Line Connector with Relocated Bowdoin Station

Alternative 1 & 2 – Red/Blue Line Connector



Legend

- Project Area
- Proposed Open Mined Shaft
- Track Alignment
- Proposed Tunnel
- Proposed Platform
- Cut and Cover
- Sequential Excavation Mining
- Tunnel Boring Machine

0 30 60 120 Feet

Red Line/ Blue Line Connector Project

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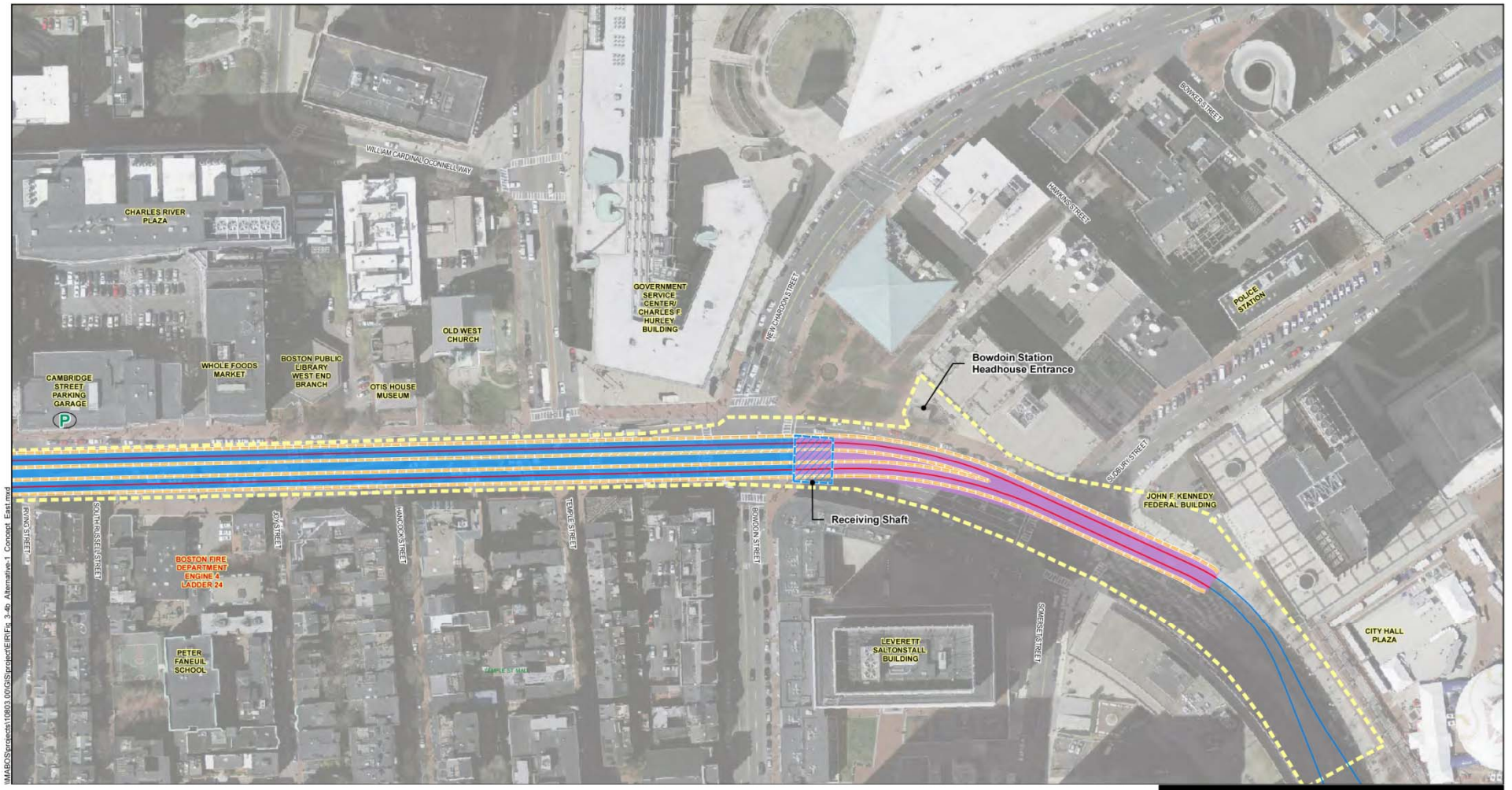
Red Line Blue Line CONNECTOR

Alternative 1 & 2

Sources: MassGIS & BWSC

Alternative 1 – Red/Blue Line Connector with Elimination of Bowdoin Station



\\MABOS\projects\10803.00\GIS\project\EIR\Fig_3-4b_Alternative-1_Concept_East.mxd

Legend

- Project Area
- Proposed Open Mined Shaft
- Track Alignment
- Proposed Tunnel
- Proposed Platform
- Existing Blue Line Track Alignment
- Cut and Cover
- Sequential Excavation Mining
- Tunnel Boring Machine

0 30 60 120 Feet

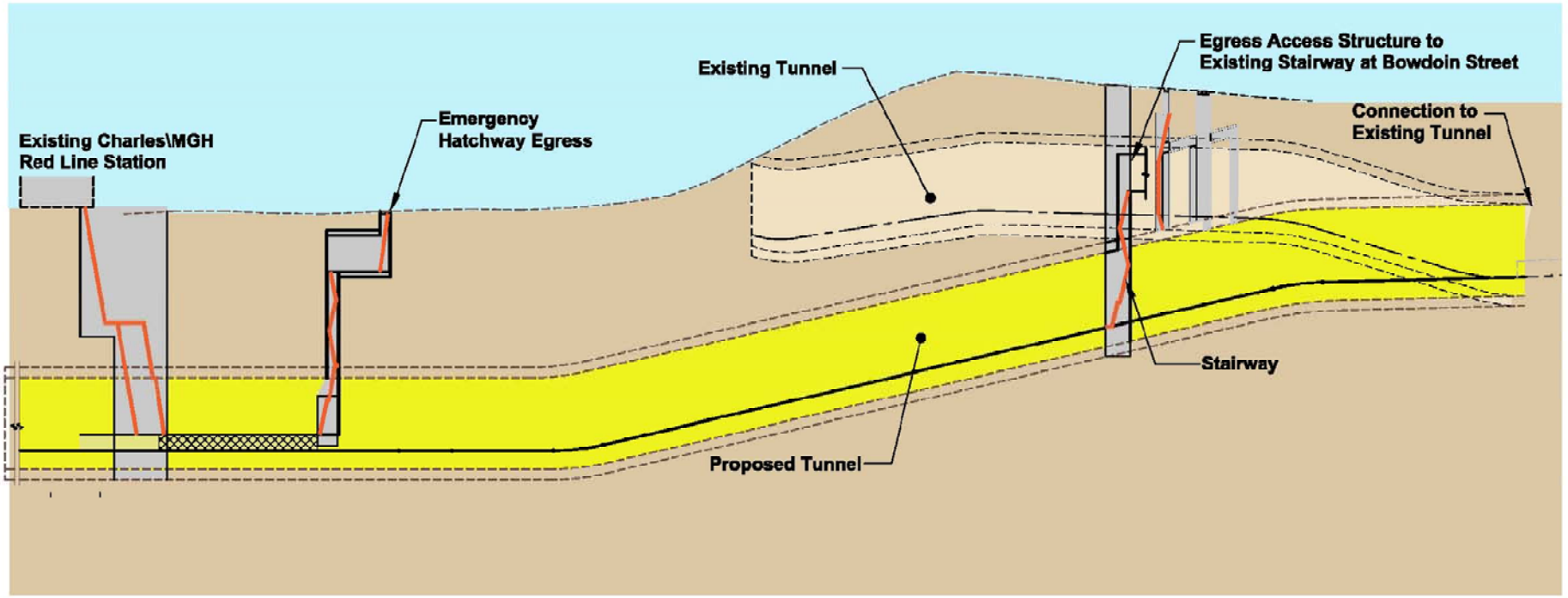
Red Line/ Blue Line Connector Project

Figure 3-4b

Alternative 1: Bowdoin Station Eliminated Conceptual Layout (East)

Sources: MassGIS & BWSC

Alternative 1 – Red/Blue Line Connector with Elimination of Bowdoin Station



Existing Grade
Existing Top of Rail
Proposed Top of Rail
Platform
Stairs

0 100 200 Feet

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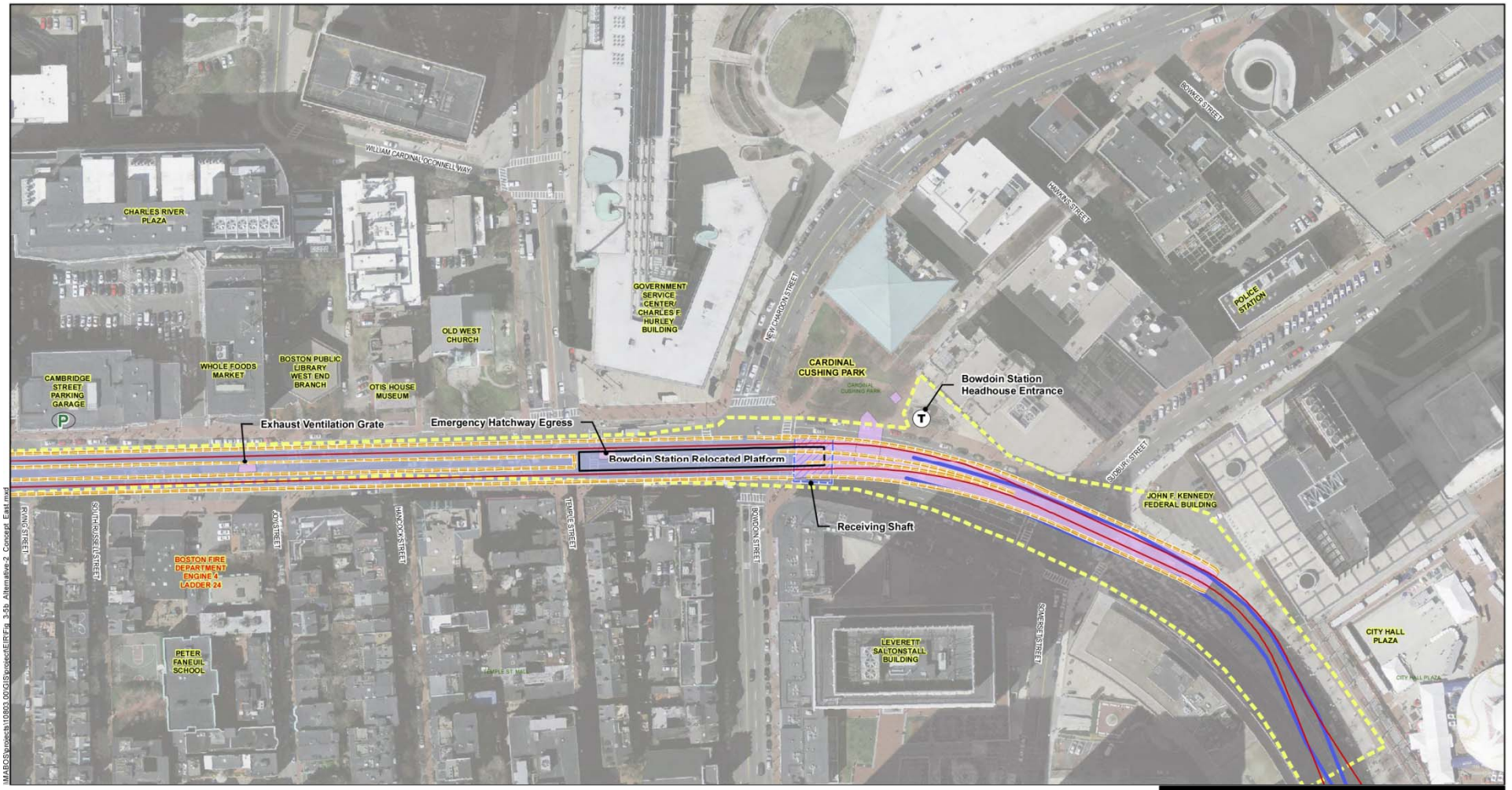
Red Line/Blue Line Connector Project

Figure ES-3

Alternative 1
Tunnel Cross-Section

Alternative 2 – Red/Blue Line Connector with Relocated Bowdoin Station



Legend

- Proposed Open Mined Shaft
- Track Alignment
- Proposed Tunnel
- Proposed Platform
- Project Area
- Cut and Cover
- Sequential Excavation Mining
- Tunnel Boring Machine

0 30 60 120 Feet

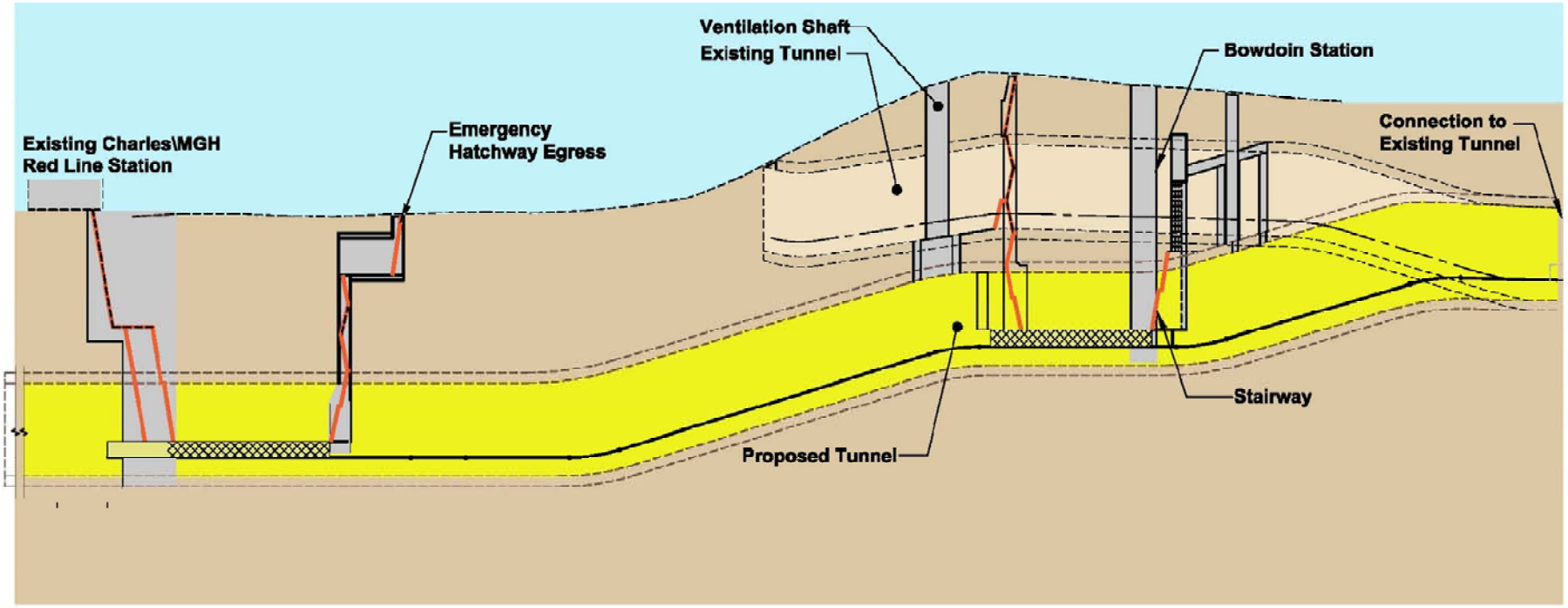
Red Line/ Blue Line Connector Project

Figure 3-5b

Alternative 2: Bowdoin Station Relocated Conceptual Layout (East)

Sources: MassGIS & BWSC

Alternative 2 – Red/Blue Line Connector with Relocated Bowdoin Station



Existing Grade
Existing Top of Rail
Proposed Top of Rail
Platform
Stairs

0 100 200 Feet

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Red Line/Blue Line Connector Project

Figure ES-5
Alternative 2
Tunnel Cross-Section

Blue Line Ridership and Operational Analysis (1 of 6)

- Developed operating plan for two build alternatives
- Assumptions :
  - *Number 5 East Boston railcars*
  - *Six-car trains in revenue service*
  - *2,700 foot double track right of way*
  - *No change in hours of Blue Line operation*
  - *Alternative 2; hours of Bowdoin Station to be expanded*
  - *Blue Line running times and headways based on September 5, 2009 Blue Line Headway Reports*

Blue Line Operational Analysis (2 of 6)

- Weekday Ridership Trends [3]
  - ✓*No Build - 2003 = 64,688*
  - ✓*No Build – 2030 = 73,000 (+12.85%)*
  - ✓*Alternative 1 – 2030 = 77,200 (+19.34%)*
  - ✓*Alternative 2 – 2030 = 77,400 (+19.65%)*

[3] – Ridership data from CTPS

Blue Line Ridership and Operational Analysis (3 of 6)

Comparison of Blue Line Extension Running Times

Alternative	One-Way Running Time (minutes)	Round Trip Running Time (minutes)	End of Line Time (minutes)	Gross Time from Gov't Ctr (WB) to Gov't Ctr (EB) (minutes)	Net increase in Round Trip Running Time (minutes)
Existing	N/A	3.00 [1]	3.00	6.00	N/A
Alternative 1	2.24	4.48	4.00	8.48	2.48
Alternative 2	3.06	6.13	4.00	10.13	4.13

[1] - Time required to travel around Bowdoin Loop from Government Center westbound to Government Center eastbound

Blue Line Ridership and Operational Analysis (4 of 6)

Peak Trains Required Based on Current Blue Line Headways

	Existing Operation (Wonderland to Bowdoin)	Alternative 1 (Wonderland to Charles/MGH)	Alternative 2 (Wonderland to Charles/MGH with stop at Bowdoin)
One –Way Running Time (Westbound)	20 min	22.5 min	24.1 min
End of Line Time (Bowdoin or Charles/MGH)	3 min	4 min	4 min
One –Way Running Time (Eastbound)	21 min	23.5 min	25.1 min
End of Line Time (Wonderland)	10 min	8 min	8 min
Cycle Time	54 min	58 min	61.3 min
AM Peak Headway	4.5 min	4.5 min	4.5 min
Train Requirements	12 peak trains	12.9 peak trains	13.6 peak trains
Run-As-Directed Train	1 train	1 train	1 train
	13 peak trains	**14 peak trains**	**15 peak trains**

Blue Line Ridership and Operational Analysis (5 of 6)

- Vehicle Load Standards [4]
  - » *225% of seats = 95 passengers per car [5]*
  - » *6-car train = 570 passengers*
- Service Capacity in peak 15 minutes
  - » *4.5 minute headway = 3.33 trains*
  - » *Total Capacity = 1,900*
- **Present capacity appears sufficient for future demand**

[4] - From MBTA Service Delivery Policy dated January 14, 2009.

[5]- Assumes Number 5 cars have the same capacity as Number 4 cars even with fewer seats (37 vs. 42)

Blue Line O&M Cost Estimates

Summary of Annual Operating and Maintenance (O&M) Costs by Alternative ($2009)

Cost Item	Existing Blue Line Annual Cost	Blue Line Annual O&M Cost inc. Alternative 1	Blue Line Annual O&M Cost inc. Alternative 2
Vehicle Operations			
Salary and Fringe	$7,294,467	$8,125,615	$9,029,309
Station Cleaning Materials and Supplies	$1,538,264	$1,538,264	$1,666,453
Vehicle Cleaning Materials and Supplies	$316,992	$326,998	$326,998
Elevator and Escalator Maintenance	$753,600	$753,600	$847,800
Vehicle Maintenance and Propulsion Power			
Propulsion Power	$3,884,836	$4,007,463	$4,007,463
Materials and Supplies	$394,421	$406,871	$406,871
Total	**$14,182,580**	**$15,158,812**	**$16,284,895**
Incremental Change in Cost		**$976,232**	**$2,102,315**

Schedule and Capital Cost

Schedule

- **Proposed Start of Construction: July 2012**
- **Anticipated Completion Date: September 2018**
- **Construction Duration: 6 years and 3 months**

Schedule Basis and Assumptions

- *The Notice to Proceed date of July 2012 is an assumed date*

Schedule and Capital Cost

Traction Power		$ 5,191,300	$ 5,550,900
Communication		$ 1,349,000	$ 2,689,000
Signals		$ 6,000,000	$ 6,000,000
Subtotal		$ 348,540,300	$ 397,239,900
GC Overhead and Profit	8%	$ 27,883,224	$ 31,779,192
Subtotal		$ 376,423,524	$ 429,019,092
Contingency for 10% Design Level	40%	$ 150,569,410	$ 171,607,637
Total Present Construction Cost		$ 526,992,934	$ 600,626,729

Schedule and Capital Cost

		Alternative 1	Alternative 2
Construction Costs			
Total Present Construction Cost		$ 526,992,934	$ 600,626,729
Trainset Cost			
2005 Cost of Train Sets		$ 13,085,000	$ 26,170,000
Design Costs			
Basic & Special: 10% of Present Construction Cost	10%	$ 52,699,293	$ 60,062,673
Construction Phase: 4% of Present Construction Cost	4%	$ 21,079,717	$ 24,025,069
Mitigation cost of MEEI Parking Lot		$ 7,000,000	$ 7,000,000
Bussing Cost			
Present Bussing Cost		$ 80,000	$ 80,000
TOTAL PRESENT COST		$ 620,936,944	$ 717,964,471

Schedule and Capital Cost

		Alternative 1	Alternative 2
Construction Costs			
Escalation (mid Point Construction)	22%	$ 115,938,445	$ 132,137,880
Total Escalated Construction Cost		$ 642,931,379	$ 732,764,609
Trainset Cost			
Escalation to Revenue Time, Year 2018	33%	$ 4,318,050	$ 8,636,100
Total Escalated Train Set Cost		$ 17,403,050	$ 34,806,100
Design Costs			
Escalation (mid point design)	4.20%	$ 2,213,370	$ 2,522,632
Escalation (mid point construction)	22%	$ 4,637,538	$ 5,285,515
Total Escalated Design Cost		$ 80,629,919	$ 91,895,890
Mitigation cost of MEEI Parking Lot		$ 7,000,000	$ 7,000,000
Bussing Cost			
Escalation to Beginning of Construction	12%	$ 9,600	$ 9,600
Total Escalated Bussing Cost		$ 89,600	$ 89,600
TOTAL PRESENT COST		$ 620,936,944	$ 717,964,471
TOTAL ESCALATED CONSTRUCTION COST		$ 748,053,948	$ 866,556,199

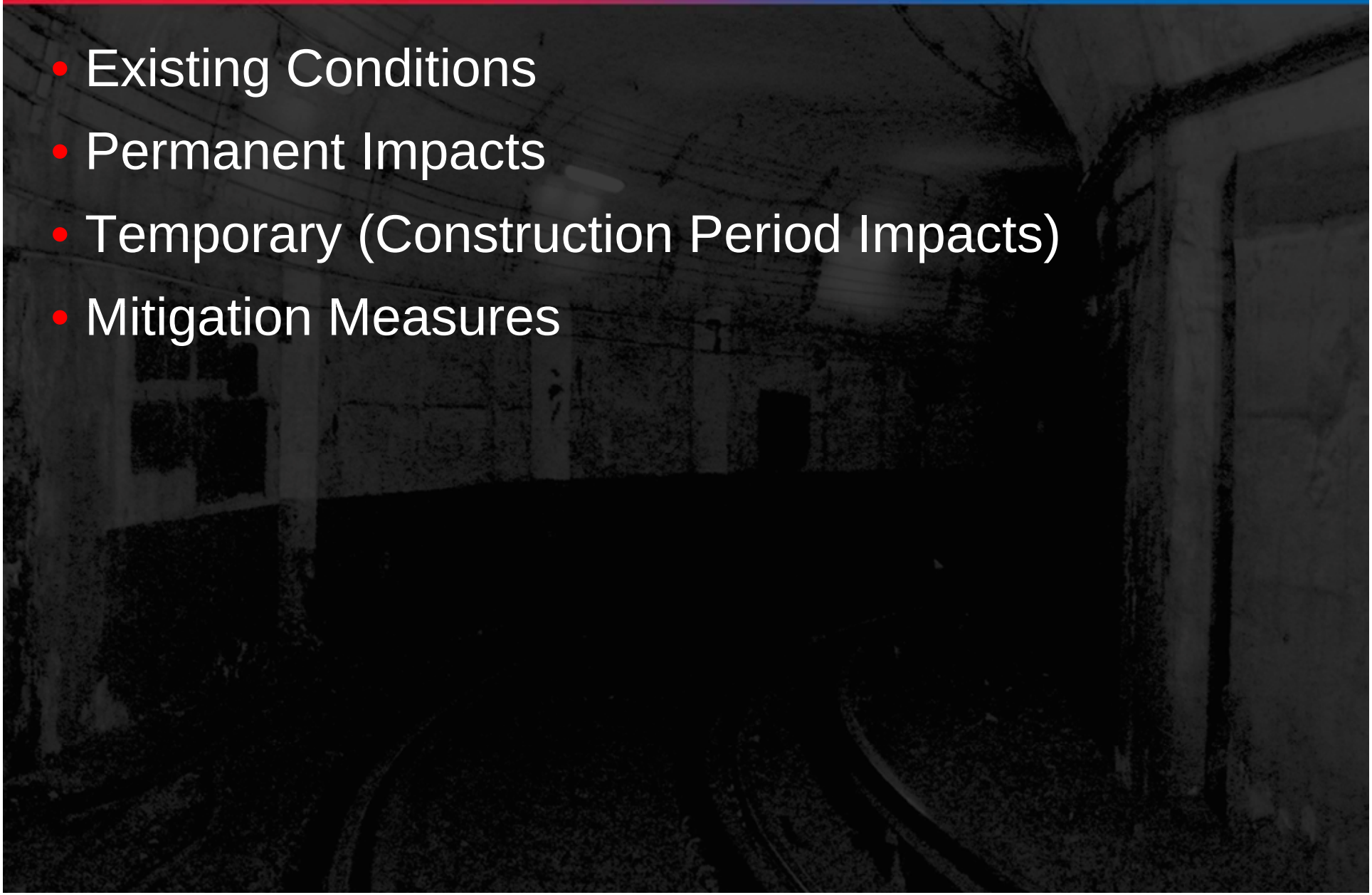
Alternative Evaluation

	Alternative 1	Alternative 2
Ridership	-	-
O&M Costs	✓	
Schedule	-	-
Total Capital Costs	✓	
Environmental Impacts	✓	

✓ = Preferred Alternative

✓ **Alternative 1 – Red/Blue Line Connector with Elimination of Bowdoin Station – *Preferred***

Environmental Analysis Overview



- Existing Conditions
- Permanent Impacts
- Temporary (Construction Period Impacts)
- Mitigation Measures

Resources Evaluated

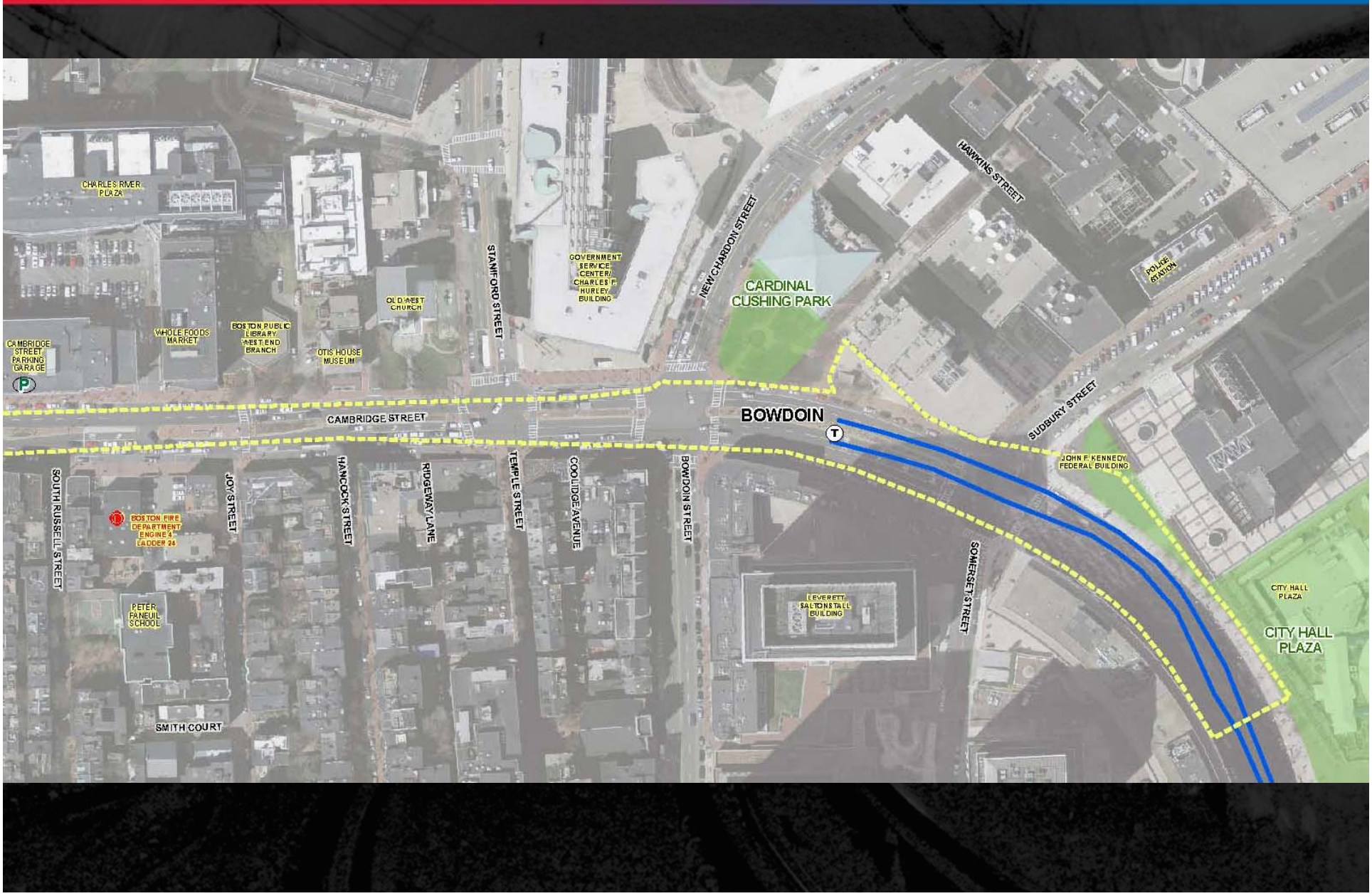
- Land Use
- Historic and Archaeological Resource
- Parks and Recreation Areas
- Environmental Justice
- Traffic (vehicles, bicycles, and pedestrians)
- Noise and Vibration
- Utilities and Stormwater
- Groundwater
- Existing Transportation Services
- Air Quality
- Visual Environment
- Hazardous Materials and Solid Wastes

Environmental Analysis Overview

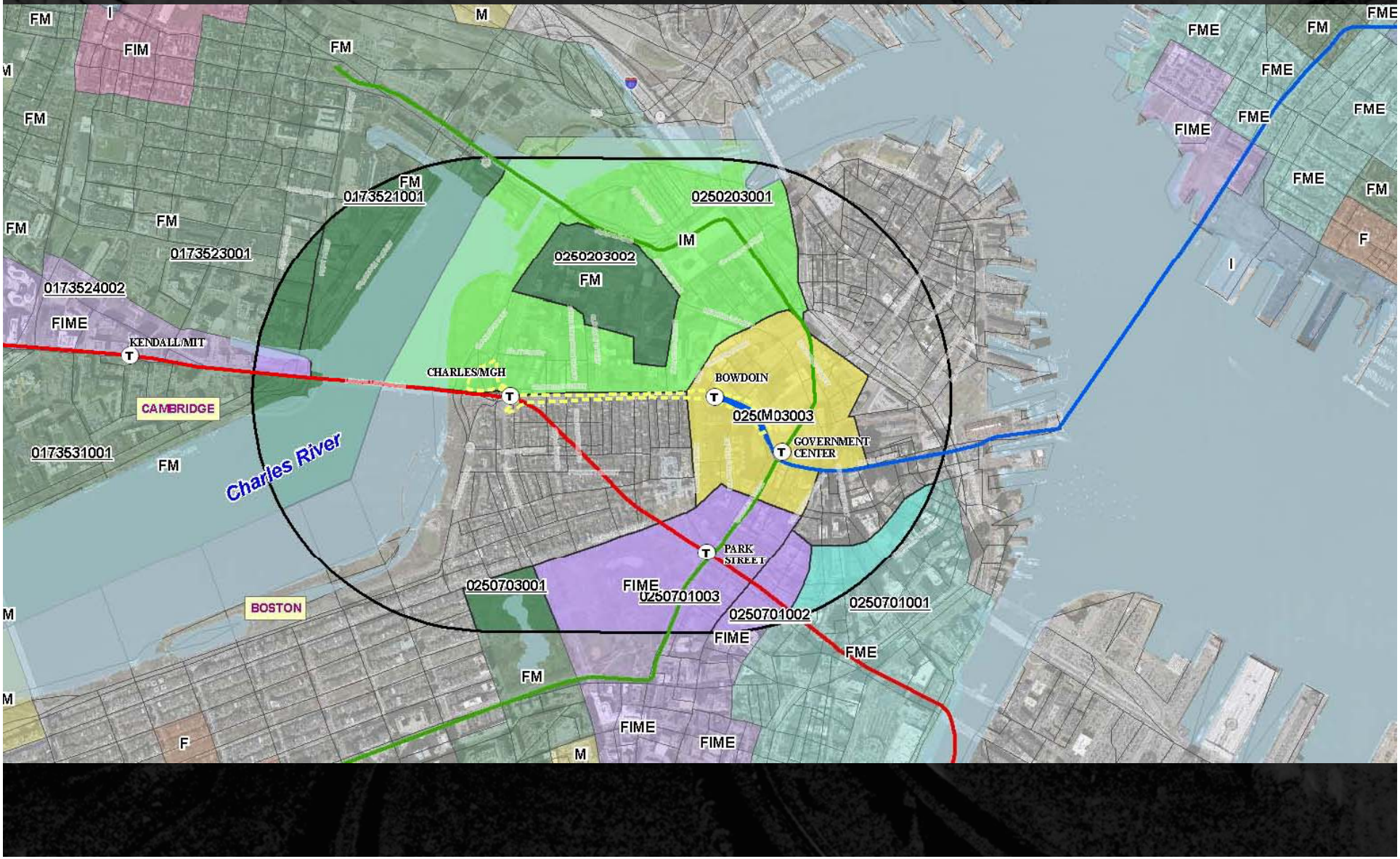
- Permanent Impacts:
  - » *Ground-borne noise (multi-family residences near Charles/MGH Station crossover)*
  - » *Potential Groundwater Dewatering*
- Temporary Impacts:
  - » *Traffic Flow/Parking*
  - » *Air Quality*
  - » *Noise/Vibration*
  - » *Utility/Stormwater System Alterations*
  - » *Generation of Hazardous Materials and Solid Waste*
- Mitigation Issues:
  - » *Groundwater Disposal to CSO/Stormwater System*
  - » *Groundwater Recharge (contaminated soil, confined spaces for treatment and infiltration)*

Historic and Archeological Resources

Parks and Recreation Areas (East Corridor)



Environmental Justice Populations



Traffic

Vehicles, pedestrians, bicyclists, and parking

No permanent impacts:

- No changes to bicycle accommodations
- No changes to LOS for vehicles or pedestrians

Traffic

Temporary Impacts Related to Construction:

- Loss of parking at MEEI visitor and patient parking lot
- Up to 89 parking spaces along Cambridge Street over the course of construction
- Temporary relocation of crosswalk at Joy Street
- Temporary limited road closures

Traffic

Temporary Impacts to Traffic and Signals:

- Signal timing or phasing changes at:
  - » *Charles Circle - Charles Street/Storrow Drive westbound off-ramp*
  - » *Cambridge Street at Joy Street*
  - » *Cambridge Street at Staniford/Temple Street*
  - » *Cambridge Street at New Chardon/Bowdoin Street*
  - » *Cambridge Street at New Sudbury/Somerset Street*
- Temporary alterations to pedestrian walkways during construction

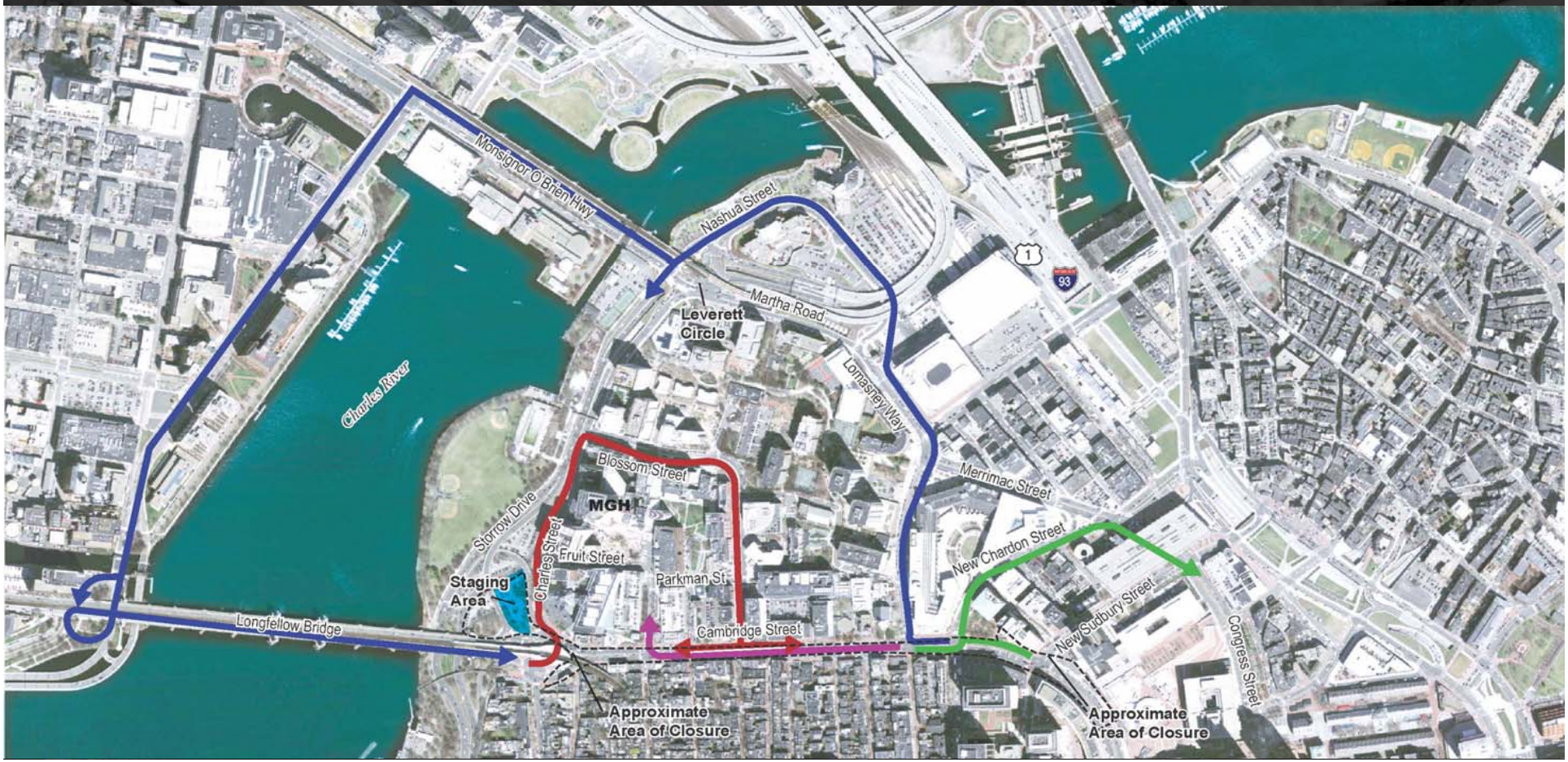
Traffic

Mitigation for Temporary Impacts:

- Establish temporary detours to minimize traffic disruption.
- Coordination of emergency response personnel (hospitals and police/fire).
- Construct temporary parking structure for MEEI visitors and patients.

Traffic

Traffic Management Plan – Detour Routes:

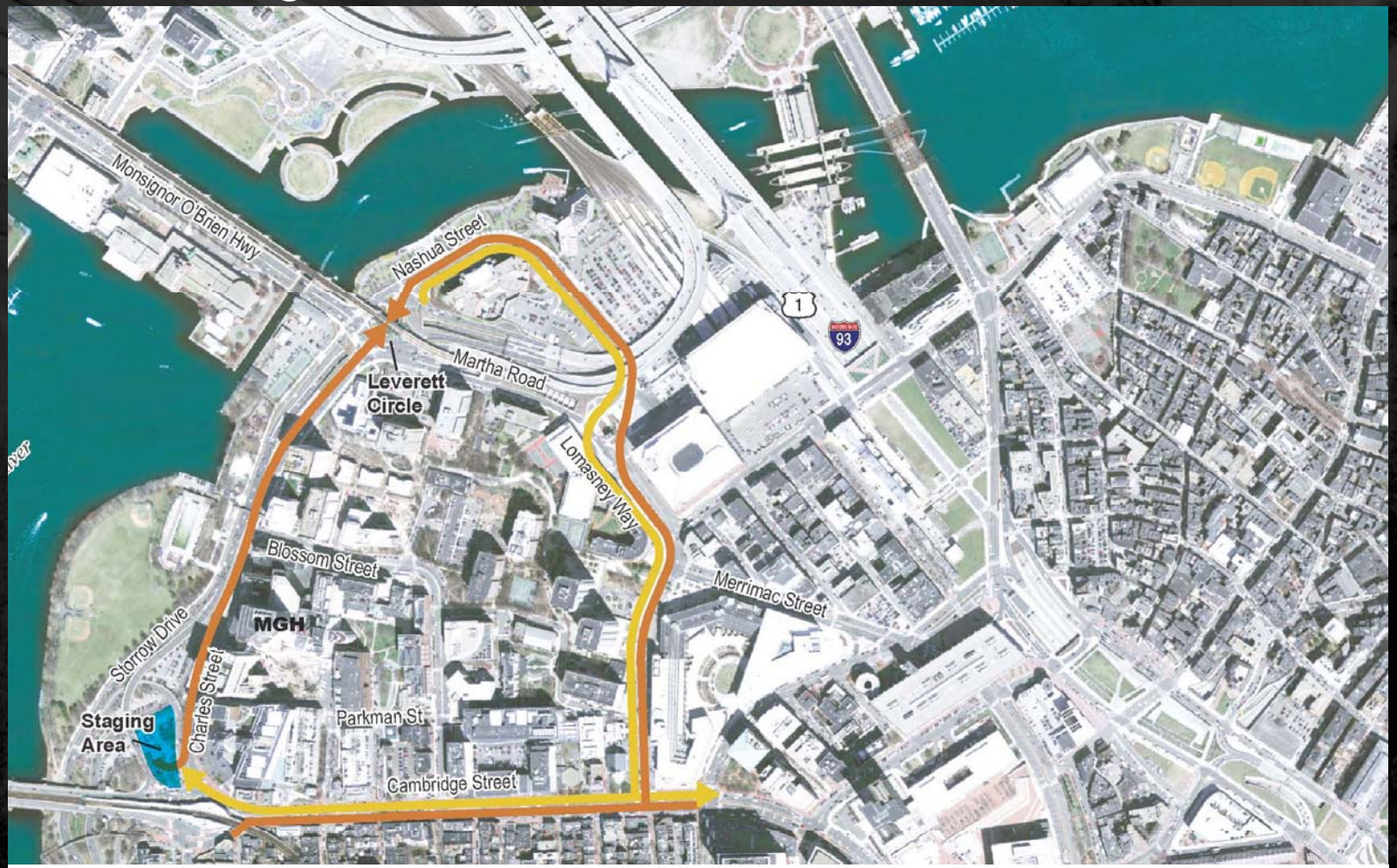


Detour Routes:

- Cambridge Street WB
- Local Access Only
- Cambridge Street EB
- New Sudbury Street

Traffic

Traffic Management Plan – Truck Routes:

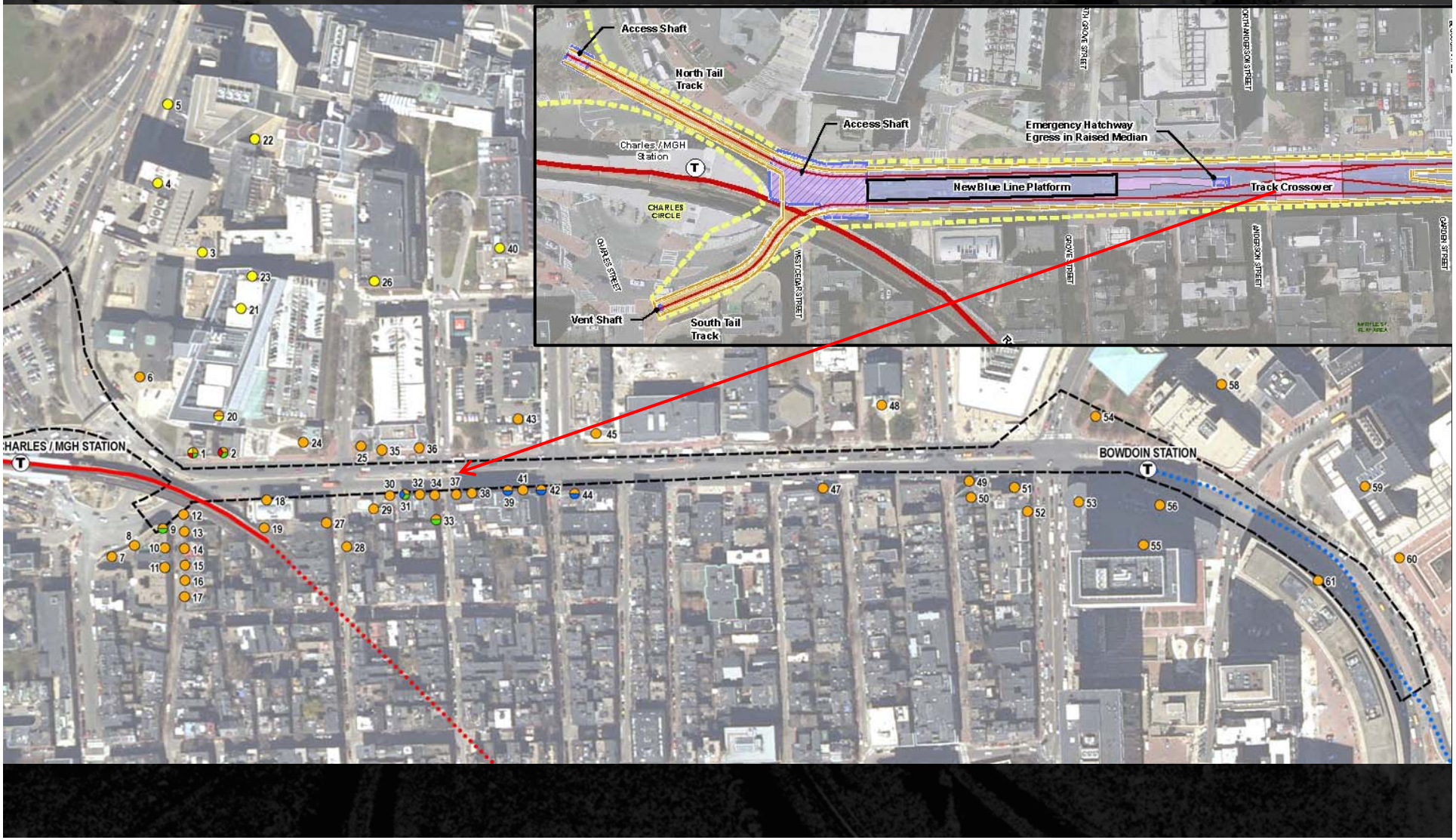


Truck Routes:

- Inbound
- Outbound

Noise and Vibration

Potential Noise/Vibration Sources:



Noise and Vibration

Temporary Impacts and Mitigation:

- Use specially quieted equipment with enclosed engines and/or high-performance mufflers.
- Avoid nighttime construction in residential neighborhoods.
- Keep truck idling to a minimum.
- Route construction equipment and vehicles through areas that would cause the least disturbance.
- Fit any air-powered equipment with pneumatic exhaust silencers.

Utilities and Stormwater

- No Permanent Impacts Anticipated
- Temporary Impacts:
  - *Temporary re-routing of existing stormwater management system*
  - *Groundwater Dewatering to Stormwater and/or CSO System (Seepage and rainwater; quantity and quality not known)*

Utilities and Stormwater

Mitigation

- All utilities relocated upon project completion
- Stormwater system will be reconstructed to existing conditions upon project completion
- CSO's will be separated where sanitary sewer lines are altered
- Construction BMPS (according to NPDES CGP) and SWPPP:
  - » *Storm Drain Inlet Protection*
  - » *Street Sweeping*
  - » *Perimeter Controls*
  - » *Stabilized Construction Entrances/exits*
  - » *Staging Area Management*

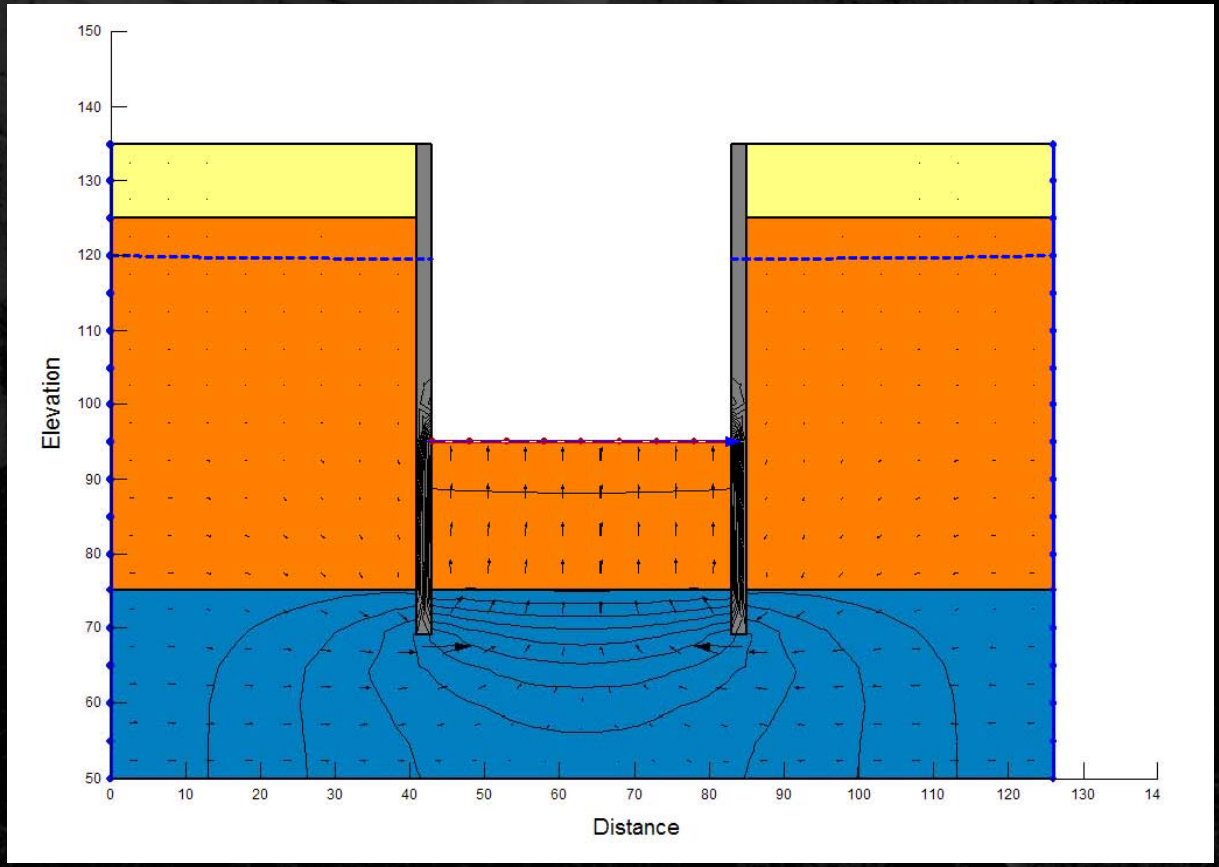
Groundwater

Existing Conditions:

- Groundwater elevations are altered from manmade structures such as sewers.
- Water table elevations and groundwater levels in deeper strata generally decline from east to west along Cambridge Street
- Buildings in the Charles Circle area, off the original Shawmut Peninsula, are supported on timber piles (many have not been underpinned).

Groundwater

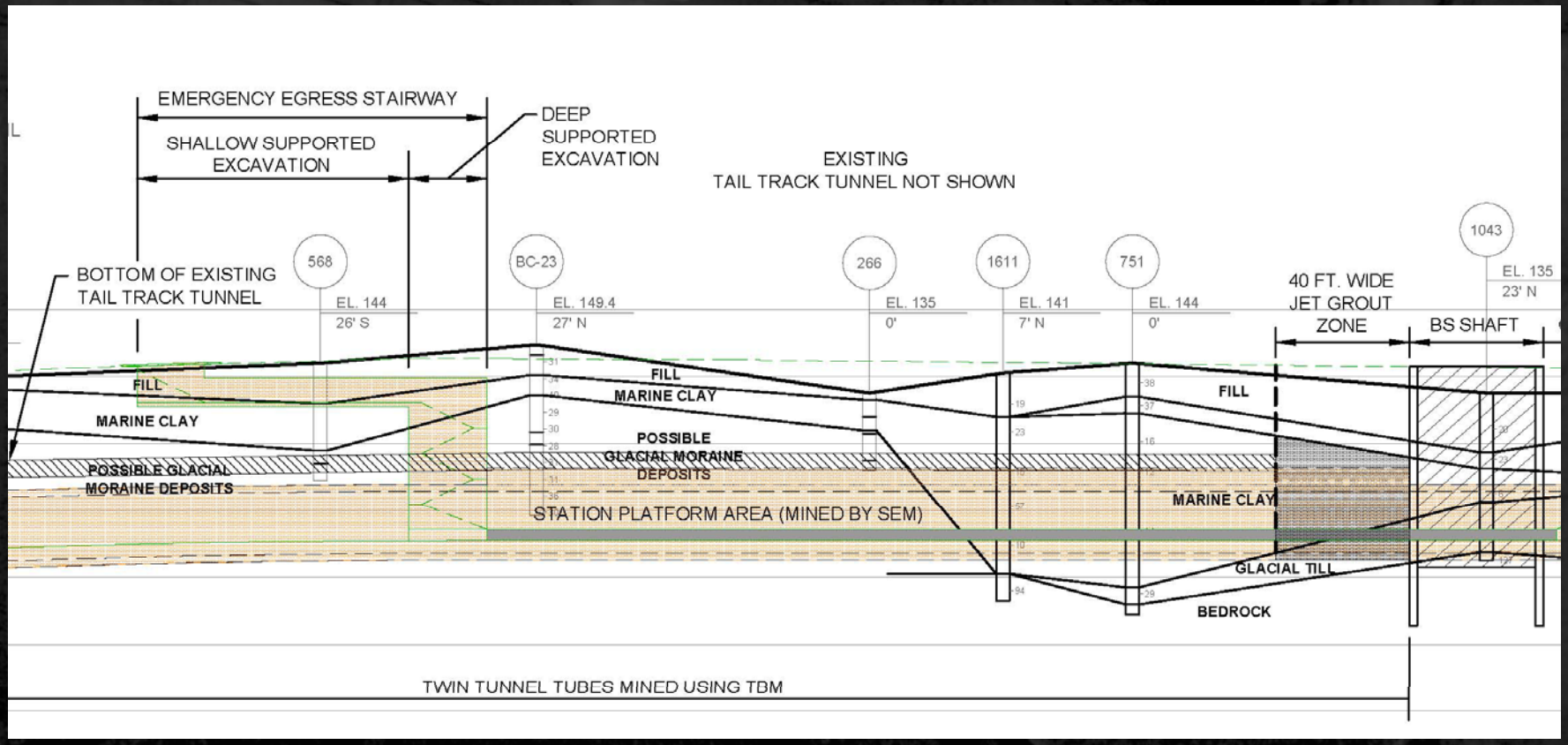
Potential Impact: Possible Long-Term Groundwater Seepage *(to be calculated in later phases of the design)*



Model Output, Cut-and-Cover Section

Groundwater

Temporary Impact: Possible Groundwater Drawdown at Bowdoin Station Area for Construction of Relocated Station



Groundwater

Mitigation:

- Permeation grouting of the glacial till in SEM tunnel areas.
- Underpin piers and foundations as necessary prior to construction.
- Monitor groundwater levels during and after construction, and seal shafts and tunnels as necessary.
- Recharge untreated groundwater to MCP-allowed areas (NPDES Remediation General Permit), AND/OR
- Recharge treated groundwater.

Other Community Issues

- Rodent Abatement measures during construction:
  - *Secured and locked above ground bait boxes seven days before beginning construction, demolition, or any land disturbance.*
  - *Proper containers for trash and food waste will be provided along the Project Area.*
- Business Access: access to all businesses along the corridor will be available.

WG & Team Comment

- Alternatives Analysis
- Technical Reports
- DEIR Executive Summary

MEPA Process/Timeline

Deliverable/Process	Date(s)	Status
Alternative Analysis Posted	2/12/10	Complete
Working Group Comment Period	2/15/10 - 3/1/10	In Process
EIR MEPA Filing	**3/31/10**	
Env. Monitor Notice	4/7/10	
MEPA Comment Period	4/7/10 – 5/20/10	
Secretary's Certificate Issued	**5/26/10**	

Public Comment

Any Public Comments or Questions?

Project Contacts

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PROJECT WEBSITE: www.mass.gov/eot/redblue